THE RECOVERY KERNEL

Substance-Specific Navigation Series

HOW TO RECOVER FROM FENTANYL

Using the Recovery Kernel Framework

Fentanyl · Carfentanil · Acetylfentanyl · M30s / Blues / Counterfeit Pills · Illicit Supply Fentanyl

Also covers: Xylazine (Tranq) co-contamination | Fentanyl test strip protocol

⚠ HARM REDUCTION RESOURCE — NOT MEDICAL ADVICE | Crisis: call 911 or text 988

FENTANYL OVERDOSE KILLS IN MINUTES. NALOXONE MAY REQUIRE MULTIPLE DOSES.

IF XYLAZINE IS PRESENT, NALOXONE WILL NOT REVERSE IT. CALL 911 FOR ANY UNRESPONSIVE PERSON.

MAT (buprenorphine/methadone) is not 'just switching drugs.' It is evidence-based medicine that saves lives.

A Note Before You Begin

The Recovery Kernel Compendium names fentanyl in its historical timeline with a precision that is also an indictment: '2013–present: Fentanyl contamination — as prescription opioids tightened, supply migrated to illicit heroin, then illicit fentanyl; 50–100x more potent than morphine; contaminating cocaine, MDMA, methamphetamine, counterfeit pills; the deadliest period in the epidemic's history.'

Every word in that sentence matters. The supply did not migrate by accident — it migrated because policy tightened access to prescription opioids without providing adequate treatment infrastructure for the people who were already dependent. The contamination is not random — it reflects economic incentives that make fentanyl cheaper and more profitable to produce than heroin. The potency is not a street phenomenon — fentanyl was developed as a pharmaceutical, first used in anesthesia in 1963, and the same molecule that kills in nanograms is administered safely every day in hospital operating rooms because the dose and context are controlled.

The people who have died from fentanyl — 110,000 Americans in 2022 alone — were not weaker than the people who used opioids twenty years ago and survived.

They were using a different substance in a different supply landscape, often without knowing it. A counterfeit pill pressed to look identical to a 30mg oxycodone tablet. A line of cocaine that tested positive for fentanyl. An unknown hotspot in a supply where the concentration is unmeasurable and unpredictable.

This guide is for people who use fentanyl intentionally and want to stop. It is also for people who use any street drug and need to understand their fentanyl exposure risk. And it is for people currently using fentanyl who are not yet ready to stop but want to survive until they are — because harm reduction is a legitimate position and the compendium holds it.

Section 0 contains the information that keeps people alive. Read it first. If you are in the presence of an unresponsive person right now: call 911, give naloxone if available, put them in the recovery position. Read Section 0 later.

If you are reading this in recovery, already on MAT, or in the early days of trying to stop: the full guide is yours. The biology of what fentanyl did, the genomic profile that made it particularly powerful for you, the medical treatment that evidence says works best, the reconstruction of the endorphin system it suppressed, and the natural architecture of the connection and meaning that opioids were managing — all of it is here.

The compendium was built for the deadliest period in the epidemic's history. This guide was built for the people surviving it.

Section 0 — Immediate Safety: The Naloxone Protocol

⚠ FENTANYL OVERDOSE IS THE LEADING CAUSE OF ACCIDENTAL DEATH IN THE UNITED STATES. IF YOU ARE NEAR ANYONE WHO USES OPIOIDS, YOU NEED NALOXONE AND YOU NEED TO KNOW HOW TO USE IT.

0.1 — Recognizing Fentanyl Overdose

THE CENTURION — The Window Is Narrower Than Any Other Opioid

Fentanyl reaches peak brain concentration faster than heroin, oxycodone, or morphine due to its high lipophilicity — it crosses the blood-brain barrier with exceptional speed. This means the time from exposure to loss of consciousness and respiratory arrest is shorter than with other opioids. People can go from apparently alert to unresponsive in under two minutes.

Sign	What it means	Response
Unresponsive — cannot be woken by voice or sternal rub	Central nervous system depression from mu-opioid receptor saturation. The opioid system has suppressed consciousness.	Call 911 immediately. Do not wait to see if they wake up. Do not put them in the car. Call 911 first.
Slow, shallow, or stopped breathing — fewer than one breath per 5 seconds	Mu-opioid receptors in the brainstem's respiratory control center are saturated. The drive to breathe is suppressed. This is the mechanism of opioid death.	Give naloxone NOW (see 0.2). Begin rescue breathing if trained. Call 911. Do not leave the person alone.
Pinpoint pupils (miosis)	Mu-opioid receptor activation causes pupil constriction. In fentanyl overdose, the pupils may be pinpoint even in bright light.	Pinpoint pupils in an unresponsive person: fentanyl overdose until proven otherwise. Give naloxone.
Blue or gray lips, fingernails, or skin (cyanosis)	Oxygen deprivation from respiratory depression. Cyanosis indicates the brain and heart have been without adequate oxygen for minutes.	911 immediately. Naloxone. Rescue breathing. Cooling and positioning. This is a late sign — act before it appears.
Gurgling or snoring breathing ('death rattle')	Airway obstruction from muscle relaxation. The tongue has fallen back. Fluid in the upper airway.	Recovery position (on their side) to prevent aspiration. Naloxone. 911. Rescue breathing if recovery position does not clear the airway.

Rigid chest / chest wall stiffness (Wooden Chest Syndrome)	Fentanyl-specific complication: mu-opioid receptor activation in the chest wall muscles causes rigidity that prevents breathing even after some naloxone response. Not seen with heroin or prescription opioids at typical doses.	This is a medical emergency requiring hospital management. Multiple doses of naloxone may be insufficient. 911 immediately — this requires ventilatory support.

0.2 — The Naloxone Protocol: Multiple Doses May Be Required

THE CENTURION — The Compendium's Non-Negotiable: Carry It. Use It. Give Multiple Doses.

The compendium states directly: 'Carry naloxone (Narcan) if you or anyone in your household uses opioids. Available without prescription at most US pharmacies. It is the difference between an overdose being survivable and not.'

For fentanyl specifically: a single standard naloxone dose may be insufficient. Fentanyl's high potency means more receptor binding that may require more naloxone to reverse. Standard naloxone dosing was calibrated for heroin; fentanyl's potency means the receptor binding may outlast a single dose.

Naloxone form	How to administer	Fentanyl-specific notes
Narcan nasal spray (4mg)	Lay person on back. Tilt head back slightly. Insert nozzle into one nostril. Press plunger firmly. If no response in 2–3 minutes: give second dose in the OTHER nostril. Repeat every 2–3 minutes until breathing improves or emergency services arrive.	For fentanyl: give the first dose and prepare the second immediately. Do not wait the full 2–3 minutes if no response — fentanyl's potency means earlier re-dosing is appropriate. Many fentanyl overdoses require 2–4 doses of 4mg Narcan.
KLOXXADO nasal spray (8mg — higher dose)	Same administration as Narcan. Single dose provides double the naloxone. Preferred for fentanyl exposures where available.	The 8mg formulation was FDA-approved in 2021 specifically for the fentanyl era. Where available, it provides greater first-dose coverage for high-potency opioids. Still repeat if no response in 2–3 minutes.
Injectable naloxone (0.4mg/mL vials)	Draw 1mL (0.4mg) into syringe. Inject intramuscularly into the outer thigh (through clothing if necessary). Give additional 0.4mg doses every 2–3 minutes if no response.	Fastest-acting when injected. IV administration is fastest of all but requires training. IM through clothing is appropriate in emergency. Multiple vials may be required for fentanyl.
Naloxone duration vs.	Naloxone's duration of action: 30–90 minutes depending on dose and	CRITICAL: Never leave a revived person alone after naloxone. They

fentanyl duration	route. Fentanyl's duration: variable — shorter than heroin for IV fentanyl, but illicit supply fentanyl may have longer duration than pharmaceutical. The person may re-overdose as naloxone wears off.	may re-overdose as the naloxone clears while fentanyl remains bound to receptors. The standard advice: 'stay with them for at least 90 minutes and call 911 even if they seem to have recovered.'

STEP-BY-STEP NALOXONE ADMINISTRATION FOR FENTANYL OVERDOSE

1. CALL 911 FIRST. Not after naloxone. Not after rescue breathing. Now. Emergency services can be dispatched while you administer naloxone. Good Samaritan laws protect naloxone administrators in most US states.
2. STIMULATE. Try to wake the person: call their name loudly, sternal rub (knuckles rubbed firmly on the sternum). This is a quick assessment step — do not spend more than 15 seconds on it.
3. RECOVERY POSITION. Roll the person onto their side to prevent aspiration of vomit. Tilt head back slightly to open airway.
4. GIVE NALOXONE — FIRST DOSE. Nasal spray: insert into one nostril, press plunger. Injectable: 0.4mg IM into outer thigh.
5. RESCUE BREATHING IF TRAINED. One breath every 5 seconds. If not trained: focus on recovery position and naloxone.
6. WAIT 2–3 MINUTES. Observe for any response — breathing improvement, movement, eye opening. For fentanyl: do not wait the full 2–3 minutes if clearly no response.
7. SECOND DOSE IF NO RESPONSE. Give into the other nostril or a different injection site. Prepare third dose.
8. CONTINUE UNTIL BREATHING NORMALIZES OR SERVICES ARRIVE. Up to 4+ doses may be needed for high-potency fentanyl.
9. DO NOT LEAVE THEM ALONE. Naloxone wears off. Fentanyl may remain. They can re-overdose after appearing to recover.

0.3 — Xylazine: The Adulterant Naloxone Cannot Reverse

⚠ XYLAZINE ('TRANQ') IS AN ANIMAL SEDATIVE INCREASINGLY PRESENT IN THE FENTANYL SUPPLY. NALOXONE DOES NOT REVERSE XYLAZINE. CALL 911 FOR ANY UNRESPONSIVE PERSON — XYLAZINE COMBINED WITH FENTANYL REQUIRES EMERGENCY VENTILATORY SUPPORT.

Xylazine (brand name Rompun) is an alpha-2 adrenergic agonist used as a veterinary sedative. It is not an opioid and is not reversed by naloxone. It is increasingly present in the fentanyl supply in the United States and has been detected in significant proportions of fentanyl samples in many cities.

What xylazine adds to fentanyl	What to look for	What to do
Prolonged sedation beyond what naloxone can reverse. Extended respiratory depression that outlasts multiple naloxone doses.	Person receives multiple doses of naloxone and shows some response (opioid component reversed) but remains deeply sedated, not breathing adequately. This is the xylazine component.	Continue naloxone (still addresses the fentanyl component). Call 911. Rescue breathing. Ventilatory support is required — this is a hospital emergency. Naloxone alone will not be sufficient.
Skin wounds: necrotic, slow-healing ulcers at injection sites and sometimes at sites distant from injection. The mechanism is not fully understood.	Deep, open wounds that do not heal normally. May appear far from any injection site. Often infected. Can progress to limb-threatening tissue necrosis.	Medical evaluation for any wound that is not healing normally. Wound care requires medical management. Some cases have required amputation. This is not a harm reduction wound kit case — it requires emergency or urgent care.
No FDA-approved reversal agent. No antidote. Supportive care only.	A person who is unresponsive after multiple naloxone doses may have significant xylazine in their system alongside fentanyl.	911. Rescue breathing. Hospital care. Xylazine is detected on some drug test strips — check your local harm reduction organization for xylazine test strip availability.

0.4 — The Counterfeit Pill Crisis: M30s, Blues, and Pressed Pills

⚠ COUNTERFEIT PILLS THAT LOOK IDENTICAL TO PHARMACEUTICAL OXYCODONE, ADDERALL, XANAX, OR PERCOCET MAY CONTAIN ONLY FENTANYL. THERE IS NO SAFE COUNTERFEIT PILL. EVERY UNVERIFIED PILL IS A POTENTIAL FENTANYL DOSE.

The Drug Enforcement Administration has warned that six out of ten M30 counterfeit pills contain potentially lethal doses of fentanyl. These pills are designed to look identical to pharmaceutical oxycodone 30mg — same color (blue), same markings ('M' and '30'), same size and shape. They are sold as 'blues,' 'Mexican oxy,' or simply 'thirties.' They contain fentanyl, fentanyl mixed with other substances, or occasionally pharmaceutical oxycodone — and there is no way to distinguish them by appearance.

- Never use a pill that was not dispensed from a licensed US pharmacy with a valid prescription, regardless of its appearance
- Fentanyl test strips: dissolve a small amount of the pill in water (about 1/4 teaspoon water per 10mg of pill), dip the strip for 15 seconds, lay flat and read at 2–5 minutes. One line = fentanyl present. Two lines = no fentanyl detected. Available through harm reduction organizations and online.

- Test strips detect fentanyl at low concentrations but do not detect fentanyl analogs with certainty (acetylfentanyl, carfentanil, furanylfentanyl). A negative test does not guarantee safety.
- If fentanyl is detected: do not use alone, start with a very small amount, have naloxone present and someone who can respond
- The DEA also reports fentanyl in counterfeit Adderall pills (pressed to look like amphetamine salts), counterfeit Xanax (pressed to look like alprazolam 2mg), counterfeit Vicodin, and other pharmaceutical analogs

0.5 — Where to Get Naloxone

- US pharmacies: naloxone is available without a prescription in most US states. Ask the pharmacist. Generic naloxone nasal spray has become widely available and affordable.
- Harm reduction organizations: many distribute naloxone for free, along with fentanyl test strips and safer use supplies
- NEXT Distro (nextdistro.org): mail-order naloxone distribution to eligible states
- SAMHSA National Helpline (1-800-662-4357): can direct to local naloxone distribution programs
- Emergency rooms and urgent care clinics: prescribe naloxone to people at risk and their household members
- NEXT Distro's naloxone locator and NEXT's interactive map: locates free naloxone distribution near you

Section 1 — What Fentanyl Did to Your Brain

THE CENTURION — The Most Potent Available Mu-Opioid Agonist — Active in Nanograms

Fentanyl is a synthetic opioid — not derived from the opium poppy but created in a laboratory — that is a full agonist at the mu-opioid receptor (MOR). The compendium names this in the opioid withdrawal sonic protocol: 'Endorphin system offline → HPA axis in overdrive → physical and psychological pain. Everything hurts — physically and emotionally. No internal pain buffer.'

That description is the exact language of what mu-opioid receptor saturation by fentanyl has done to the endogenous opioid system — and what its absence produces. Understanding the mechanism explains why recovery requires rebuilding the endogenous system rather than simply stopping the exogenous one.

1.1 — The Mu-Opioid Receptor System: What Was Borrowed From

What the MOR system normally does	What fentanyl did to it	What recovery requires
Pain modulation — the body's natural analgesic system	Fentanyl's full MOR agonism provided complete, immediate pain relief — more complete than any level of endogenous opioid activity could provide. This is why fentanyl is used in surgical anesthesia. The same mechanism that makes it medically useful makes it pharmacologically irresistible for anyone in chronic pain.	The endorphin system that was providing pain modulation is suppressed. MOR receptor downregulation means the natural pain buffer operates below baseline for months after cessation. Chronic pain management — often the underlying reason for initial opioid use — must be addressed through non-opioid means during recovery.
Emotional pain regulation — endorphins modulate distress, grief, and emotional suffering	Fentanyl's MOR agonism activates the same pathways that process emotional pain — producing emotional analgesia alongside physical. The person who used fentanyl to manage not just physical pain but the pain of loss, trauma, loneliness, or despair was using it with pharmacological precision for the pain system it actually addresses.	The emotional pain the fentanyl was managing is not resolved by stopping fentanyl. It is unmasked. Recovery requires addressing the underlying pain — trauma treatment, grief work, community, and the endorphin system rebuilding that makes the emotional pain system functional again.

Social bonding reward — MOR activation is part of the neurochemistry of social connection	The compendium names OPRM1 specifically in this context: 'OPRM1 (Opioid) — variants affect social bonding reward.' Endorphins released during genuine human connection — laughter, physical affection, deep conversation — activate MOR receptors. Fentanyl saturated these receptors constantly. Social connection lost its neurochemical pull.	The social bonding MOR pathway must be rebuilt through genuine human connection, laughter, physical safe touch, and community — the same activities that activate endorphin release naturally. This is not metaphor. These activities literally activate the same receptors that fentanyl was saturating.
Stress response buffer — endorphins reduce HPA axis activation during stress	Fentanyl's MOR agonism suppressed the HPA axis and provided profound relief from stress and anxiety. The person using fentanyl to manage anxiety disorders, PTSD, or chronic stress was accessing the opioid system's genuine anti-stress mechanism.	HPA axis rebound is the most prominent physical experience of opioid withdrawal — 'everything hurts, is too loud, is too much.' Restoring HPA axis regulation is a central early recovery target addressed through the supplement protocol and behavioral tools.
Reward system dopamine modulation	MOR activation in the ventral tegmental area (VTA) disinhibits dopamine neurons — producing dopamine release in the nucleus accumbens that is part of opioids' rewarding effect. Not as directly dopaminergic as cocaine or meth, but the dopamine system is involved.	Secondary dopamine system recovery supports motivation and reward in opioid recovery — though less central than in stimulant recovery. Exercise is the primary dopamine-opioid co-recovery intervention: it stimulates both BDNF and endogenous opioid release simultaneously.

1.2 — Why Fentanyl Is Different From Other Opioids

THE CENTURION — 100 Times More Potent Than Morphine — The Number That Explains the Crisis

Opioid	Potency vs. morphine	What this means clinically
Morphine	1x (reference)	The reference standard. Active at milligram doses. Therapeutic range well-characterized. Overdose timeline: minutes to hours depending on route.
Heroin (diacetylmorphine)	2–3x	Faster-acting than morphine due to diacetyl group increasing lipophilicity. Standard illicit opioid for decades. Overdose timeline: faster than morphine.
Oxycodone / Hydrocodone	1.5–2x	Prescription opioids. Semi-synthetic. Active at milligram doses. The prescription opioid epidemic's

		primary vehicle.
Fentanyl	50–100x	Active at microgram doses. The lethal dose is a grain of salt-sized amount. A dose that barely registers on a scale can kill. Hotspot problem: uneven distribution in pressed pills or powders means one portion can contain 10x the fentanyl of the adjacent portion. No reliable dose from unverified supply.
Carfentanil	10,000x	A fentanyl analog used as a large-animal (elephant) tranquilizer. Has appeared in illicit fentanyl supplies. At 10,000x morphine potency, the margin between an active dose and a lethal dose is essentially zero for any uncontrolled use context.

1.3 — The Hotspot Problem: Why Fentanyl Supply Is Uniquely Unpredictable

THE CENTURION — The Same Bag Can Contain a Dose and a Death in Adjacent Amounts

Fentanyl is not evenly distributed in illicitly produced supply. When fentanyl is mixed into a powder or pressed into a pill, the distribution is not uniform — some portions of the batch contain far more fentanyl than others. A single bag of powder may have an amount that produces the expected effect in one line and a lethal amount in the next portion of the same bag.

This 'hotspot' phenomenon is unique to fentanyl and does not occur with heroin or prescription opioids at typical doses. It is one of the primary reasons that tolerance developed to a previous supply does not protect the user from the next supply — even from the same source.

- The hotspot problem means: 'I've done this amount from this source before' is not safety information for fentanyl
- Start with a much smaller amount than usual after any break in use, after supply change, after release from incarceration, after medical care, or after any period of reduced tolerance
- After even 3–4 days without opioids, tolerance drops significantly. A dose that was ordinary before the break can be lethal after it
- The most dangerous period for overdose is the 2 weeks following release from incarceration, hospital discharge, or any supervised abstinence period — tolerance has dropped while cravings and supply access have returned simultaneously

1.4 — The Supply Contamination Landscape: Fentanyl in Everything

The compendium: 'contaminating cocaine, MDMA, methamphetamine, counterfeit pills.' This is no longer occasional cross-contamination — it is the structural reality of the current illicit drug supply in the United States and increasingly globally.

Substance	Fentanyl contamination prevalence	Specific risk
Illicit fentanyl / fentanyl powder	Primary substance — 100% fentanyl or fentanyl with adulterants (xylazine, benzodiazepines, caffeine)	Hotspot distribution, xylazine co-contamination, no dose standardization
Counterfeit pills (M30s, blues, fake Xanax, fake Adderall)	DEA reports >60% of counterfeit oxycodone-lookalike pills contain potentially lethal fentanyl doses. Xanax counterfeits and Adderall counterfeits are also frequently fentanyl-contaminated.	No visual differentiation from pharmaceutical pills. No dose predictability. The highest per-pill fentanyl exposure risk.
Illicit heroin	Much of what is sold as heroin in the US is now entirely fentanyl or fentanyl mixed with heroin. Pure heroin without fentanyl is rare in many markets.	Users who believe they are using heroin may be using fentanyl — and their heroin tolerance does not protect them from fentanyl's potency differential.
Cocaine and methamphetamine	Variable contamination rates — lower than opioid-presenting drugs but documented across multiple studies. Fentanyl in cocaine has produced overdose deaths in stimulant users with zero opioid tolerance.	Stimulant users with no opioid tolerance who are exposed to fentanyl-contaminated cocaine have no baseline protection. A tiny amount of fentanyl can cause fatal respiratory depression in an opioid-naive person.
MDMA / ecstasy / 'molly'	Fentanyl detected in MDMA supply samples in multiple testing programs. Less common than in stimulants but documented.	Same opioid-naive risk as for cocaine users. Test strips for every MDMA sample — fentanyl is not detectable by taste, appearance, or smell.

Section 2 — Your Genomic Blueprint

Fentanyl has a specific and clinically important pharmacogenomic profile. The compendium explicitly flags CYP2D6 as potentially fatal for opioid metabolism and OPRM1 for mu-opioid receptor sensitivity. These genes determine who needed higher doses to feel the same effect, who experienced more intense pain sensitivity in withdrawal, and who responds differently to MAT.

The DNA Testing Panel for Fentanyl Recovery

Gene	What it controls	Key variant	Fentanyl recovery relevance
OPRM1	Mu-opioid receptor — the primary receptor all opioids including fentanyl act on	A118G (rs1799971) — A/A wild type, A/G heterozygous, G/G homozygous reduced binding	THE primary opioid pharmacogenomics gene. The compendium names it explicitly. G allele carriers have reduced mu-opioid receptor binding affinity — they experience opioids as less effective at standard doses AND have reduced endorphin response to natural rewards (exercise, laughter, connection) because the same receptor mediates both. Recovery implications: (1) natural reward architecture may take longer to feel satisfying because the receptor binds endorphins less efficiently; (2) MAT with naltrexone shows STRONGER response in G allele carriers — the receptor blockade is paradoxically more effective. Also: G/G individuals may have had lower social bonding reward from connection — fentanyl may have been providing social-bonding neurochemistry that the endorphin system underdelivered.
CYP3A4	Primary metabolizer of fentanyl — converts fentanyl to norfentanyl for clearance	Inducers vs. inhibitors; multiple variants affecting enzyme activity	THE most critical pharmacokinetic gene for fentanyl specifically. The compendium warns about CYP2D6 for opioids — for fentanyl, CYP3A4 is the primary pathway. CYP3A4 inhibitors (fluconazole, certain antibiotics like erythromycin, grapefruit, many HIV medications) can dramatically prolong fentanyl's duration and intensity. CYP3A4 inducers (rifampin,

			carbamazepine, St. John's Wort) accelerate clearance and may precipitate withdrawal in fentanyl-dependent individuals. CRITICAL for people with HIV taking antiretroviral therapy — many ARTs strongly inhibit CYP3A4, dramatically increasing fentanyl's effective plasma levels.
CYP2D6	Secondary fentanyl metabolism pathway AND primary metabolism pathway for many other opioids	Poor metabolizer (*4/*4), intermediate, ultra-rapid (*1x2 etc.)	The compendium explicitly flags CYP2D6 for opioids: 'It can prevent a future prescription from being either ineffective or fatal.' For fentanyl itself, CYP2D6 is a secondary pathway. But it is primary for codeine, tramadol, and hydrocodone. Ultra-rapid CYP2D6: codeine converts to morphine too fast (deaths documented, FDA black box warning). Poor CYP2D6: codeine and tramadol don't work (no conversion to active form). Know your status before any opioid prescription during or after recovery.
COMT	Dopamine and catecholamine clearance; also affects pain sensitivity	Val158Met (rs4680)	COMT is relevant to fentanyl recovery through two mechanisms: (1) pain sensitivity — Met/Met (Sage, slow COMT) carriers have lower pain thresholds and higher pain sensitivity, making them more likely to use opioids for genuine pain management; (2) dopamine recovery — the secondary dopamine component of opioid use follows the same COMT-mediated pattern as stimulant use. Sage constitution in fentanyl recovery: anxiety and pain management are primary recovery targets alongside opioid receptor restoration.
MTHFR	Methylation — dopamine, serotonin, and endorphin synthesis foundation	C677T (rs1801133), A1298C (rs1801131)	MTHFR variants reduce neurotransmitter synthesis efficiency across all systems — including the endorphin precursor synthesis pathway. People with MTHFR variants may have had lower baseline endorphin activity, making them more vulnerable to the pharmacological relief that fentanyl provides. 5-MTHF supplementation addresses this baseline deficit directly and often produces meaningful improvement in pain sensitivity and emotional regulation

			during recovery.
SLC6A4 / 5-HTTLPR	Serotonin transporter — anxiety sensitivity and emotional pain buffer	Short/short allele	SLC6A4 short/short carriers have high anxiety sensitivity and lower emotional pain buffering capacity. Fentanyl's MOR activation directly reduces anxiety and emotional pain — the same pathway that GABA drugs activate for anxiety management but through a different mechanism. Short/short SLC6A4 carriers may have been using fentanyl partly for anxiety management. Recovery must address the anxiety system directly (see Section 4).
GABRA2	GABA-A receptor baseline tone — relevant to anxiety and co-occurring alcohol use	rs279858 high-risk haplotype	Significant proportion of opioid use disorder populations also have alcohol use disorder and benzodiazepine use disorder — often with GABRA2 high-risk variants underlying both. If alcohol or benzodiazepine co-use is present alongside fentanyl: the GABRA2 status matters for both withdrawal risk and recovery architecture. Combined opioid-GABAergic withdrawal is clinically dangerous.

Phenotyping Without Testing

- Did opioids work less well than expected at standard doses — required higher doses than peers to feel the same effect? → Likely OPRM1 A/G or G/G variant. The reduced receptor binding affinity requires more drug for equivalent effect — and makes natural endorphin rewards feel less satisfying at baseline.
- Did you use fentanyl primarily for pain rather than euphoria? → COMT Met/Met (higher pain sensitivity) + OPRM1 G allele (reduced natural pain buffer) + possibly MTHFR (reduced endorphin precursor synthesis). Chronic pain management is a primary recovery track, not an afterthought.
- Did other medications affect fentanyl more than expected — particularly HIV medications, antifungals, or certain antibiotics? → CYP3A4 drug-drug interaction. Know your CYP3A4 inhibitors and inducers — this affects the safety of fentanyl use and may have been creating unpredictably intense effects.
- Do you also have significant alcohol or benzodiazepine use? → Possible GABRA2 high-risk haplotype. Combined withdrawal from opioids + alcohol/benzos is medically dangerous. Medical assessment before any attempt to stop.

- Was anxiety or emotional pain the primary driver alongside physical pain? → SLC6A4 short/short + COMT Met/Met Sage profile. Anxiety treatment is a parallel recovery track.

Section 3 — Medication-Assisted Treatment: The Medicine That Saves Lives

THE CENTURION — MAT Is Not 'Just Switching Drugs.' The Compendium's Position Is Unambiguous: It Is Medicine.

The compendium is explicit about this: 'A prescription that keeps the system stable while underlying conditions are being addressed is a scaffold — useful, appropriate, time-limited. A prescription that substitutes for addressing those conditions indefinitely has become its own form of dependency. The scaffold that prevents the building from being finished is not serving its original purpose.'

For opioid use disorder in the fentanyl era, this framing applies with one critical addition: in many cases, the scaffold is what keeps the person alive long enough to do any building at all. The evidence is unambiguous. Buprenorphine and methadone reduce opioid overdose mortality by 50–70%. People on MAT stay in treatment, reconnect with family, return to employment, and survive. People who discontinue MAT or who cannot access it die at dramatically higher rates.

The Recovery Kernel does not treat MAT as a lesser form of recovery. It treats it as the primary medical intervention for a medical condition — the foundation on which the rest of this guide's work is built.

3.1 — The Three FDA-Approved MAT Options

Medication	Mechanism	Administration	Evidence and considerations
Buprenorphine (Suboxone, Subutex, Sublocade, Brixam)	Partial mu-opioid agonist — activates MOR at a ceiling effect, preventing withdrawal and craving without producing the full euphoria of full agonists. Naloxone added in Suboxone formulation as abuse deterrent.	Sublingual film or tablet (Suboxone) daily. Sublocade: monthly subcutaneous injection. Brixam: implant lasting 6 months.	First-line treatment for opioid use disorder. Can now be prescribed by any licensed provider (DEA X-waiver requirement removed in 2023 — any DEA-registered provider can prescribe). Most accessible MAT option. Strong evidence for mortality reduction. OPRM1 G allele: may require dose adjustment. CYP3A4 interactions relevant.
Methadone	Full mu-opioid agonist — activates MOR fully, preventing	Daily oral liquid dispensed at federally licensed Opioid Treatment	Most evidence-based treatment for severe opioid use disorder including fentanyl. Higher

	withdrawal and craving through stable blood levels that don't produce the peaks associated with fentanyl.	Programs (OTPs). Cannot be prescribed by individual physicians for opioid use disorder — must be dispensed through licensed clinic.	doses required for fentanyl dependence than heroin. QTc prolongation risk — ECG before and during treatment. Drug-drug interactions. Accessed through OTP clinics. More structured but also more supervised. Evidence for mortality reduction comparable to buprenorphine.
Extended-release naltrexone (Vivitrol)	Full mu-opioid receptor antagonist — blocks all opioid effects completely. Does not activate MOR at all. Monthly injection.	Monthly intramuscular injection. Requires complete detox from all opioids before initiation — even a partial dose during naltrexone treatment precipitates severe withdrawal.	Strong evidence for relapse prevention AFTER detox is complete. OPRM1 G allele: shows strongest response to naltrexone. Requires complete opioid clearance (typically 7–10 days) before initiation — this period is high overdose risk. Best evidence in criminal justice and post-incarceration settings. Cannot be used while any opioid is in system.

3.2 — MAT for Fentanyl-Specific Considerations

⚠ FENTANYL'S HIGHER RECEPTOR BINDING AFFINITY MEANS BUPRENORPHINE INDUCTION MAY CAUSE PRECIPITATED WITHDRAWAL IF STARTED TOO SOON AFTER LAST FENTANYL USE. DISCUSS INDUCTION TIMING WITH YOUR PRESCRIBER.

Several aspects of fentanyl's pharmacology require adjustments to standard MAT protocols:

- Buprenorphine precipitated withdrawal: because buprenorphine has high receptor affinity but partial agonism, if given while fentanyl is still occupying receptors, it displaces fentanyl and causes sudden precipitated withdrawal — far more severe and rapid than standard withdrawal. Traditional guidance was to wait until moderate withdrawal symptoms before buprenorphine initiation. Newer low-dose 'microdosing' induction protocols (Bernese method) allow initiation without waiting for full withdrawal — discuss with your prescriber.

- Higher methadone doses for fentanyl: people dependent on high-potency fentanyl often require higher methadone doses for adequate stabilization than was standard for heroin-dependent patients. Standard starting doses may be inadequate. Dose titration guided by clinical response rather than historical averages.
- CYP3A4 and buprenorphine: buprenorphine is also CYP3A4-metabolized. CYP3A4 inhibitors increase buprenorphine plasma levels. Disclose all medications to your MAT prescriber.
- Duration of MAT: the evidence supports extended (often indefinite) MAT rather than time-limited courses. Stopping MAT prematurely dramatically increases relapse and overdose death risk. 'Duration of treatment' should be driven by clinical stability, not arbitrary timelines.

3.3 — How to Access MAT

- SAMHSA Treatment Locator (findtreatment.gov or 1-800-662-4357): finds buprenorphine prescribers and methadone clinics by location
- Any licensed prescriber (2023 onwards): buprenorphine can now be prescribed by any DEA-registered physician, nurse practitioner, or physician assistant without the previous X-waiver requirement
- Telehealth buprenorphine: numerous telehealth services (Done Health, Bicycle Health, Ophelia, Monument, and others) provide buprenorphine prescriptions remotely — significantly expanding access
- Emergency departments: many emergency departments can initiate buprenorphine during an emergency visit and connect to outpatient follow-up — the 'bridge prescribing' model
- Low Threshold and same-day access programs: some clinics offer same-day buprenorphine induction without requiring abstinence documentation or insurance
- Cost: Medicaid covers MAT in all states. Medicare Part D covers MAT. Many private insurances cover with prior authorization. Patient assistance programs exist for uninsured.

Section 4 — Biological Reconstruction: Rebuilding the Endorphin System

THE CENTURION — The System Is Not Broken. It Has Been Outsourced. Recovery Is Bringing It Home.

The compendium's opioid withdrawal framework is precise: 'Endorphin system offline → HPA axis in overdrive → physical and psychological pain.' Recovery is the process of bringing the endorphin system back online — rebuilding the capacity for natural endorphin release, restoring MOR receptor density and sensitivity, and normalizing the HPA axis that has been hyperactivated by chronic opioid suppression.

Everything in this section applies whether or not you are on MAT. MAT stabilizes the MOR system at a functional level — it does not rebuild it. The supplement and behavioral protocol in this section supports MOR system recovery while MAT maintains stability.

4.1 — The Methylation Foundation

Supplement	Dose	Timing	Fentanyl-specific notes
5-MTHF (L-methylfolate)	400–1000mcg daily	Morning with food	Endorphin (beta-endorphin and enkephalin) synthesis requires the methylation cycle for precursor availability. MTHFR variants that reduce 5-MTHF availability reduce endorphin synthesis capacity — potentially contributing to both the initial vulnerability to opioid use AND the difficulty of endorphin system recovery. 5-MTHF directly addresses this synthesis bottleneck.
Methylcobalamin (B12)	1000–2000mcg sublingual	Morning	Active B12 for methylation support alongside 5-MTHF. Fentanyl binge patterns and associated lifestyle factors deplete B12. Neurological repair — myelin integrity, nerve conduction — is supported by methylcobalamin specifically. Sublingual form for reliable absorption.
P5P (active B6)	25–50mg	Morning	Cofactor for DOPA decarboxylase

			and for amino acid metabolism relevant to endorphin precursor synthesis. The endorphin peptides (beta-endorphin, enkephalins, dynorphins) are synthesized from amino acid precursors through pathways that require P5P-dependent enzymes.
Magnesium glycinate	400–600mg elemental	Morning and evening	Addresses opioid withdrawal hyperexcitability through NMDA antagonism and GABA receptor support. The HPA axis overdrive of opioid withdrawal is modulated by magnesium through cortisol regulation. Also supports sleep — the sleep disruption of opioid withdrawal is among the most persistent and most distressing withdrawal symptoms.

4.2 — Endorphin System Reconstruction

THE CENTURION — DLPA: The Supplement That Extends the Life of Your Own Endorphins

Supplement	Dose	Timing	Why it matters for fentanyl recovery
DLPA (DL-Phenylalanine)	750–1500mg daily	Morning and midday, away from protein	DLPA inhibits enkephalinase — the enzyme that breaks down endogenous opioids (enkephalins). By slowing enkephalin breakdown, DLPA allows the body's own opioid peptides to remain active longer. This is the most pharmacologically specific supplement for opioid recovery: it directly supports the endogenous opioid system that fentanyl suppressed. Not a substitute for MAT, but a meaningful adjunct that supports natural endorphin activity. Also a dopamine and norepinephrine precursor (L-phenylalanine component) — providing secondary stimulant-recovery

			benefit.
NAC (N-Acetyl Cysteine)	600–1800mg daily in divided doses	Morning and evening with food	Restores glutamate homeostasis — the glutamate system's rebound hyperactivity is a significant component of opioid withdrawal and craving. Multiple clinical trials support NAC for opioid craving reduction. Also provides glutathione precursor support for the oxidative stress of opioid withdrawal and rebuilding. Begin immediately on cessation or alongside MAT.
Omega-3 DHA + EPA	2–4g daily	With food, morning	MOR receptors are embedded in neuronal membranes — DHA is the primary structural component of neuronal membrane phospholipids. DHA-rich membranes support receptor density recovery and optimal receptor signaling. EPA reduces the neuroinflammation that chronic fentanyl use generates. Both functions support MOR system recovery.
L-Tyrosine	500–1000mg	Morning, away from protein	Dopamine precursor for the secondary dopamine recovery component of opioid recovery. Also norepinephrine precursor — supporting the energy and motivation that is dramatically impaired in early opioid recovery. Lower priority than DLPA and NAC for fentanyl specifically but valuable for the motivational and energy components of the post-acute phase.
5-HTP	50–100mg	Evening	Serotonin precursor for sleep and mood support. Opioids significantly affect serotonin transmission through MOR-mediated pathways. 5-HTP evening dosing supports both mood recovery and the sleep architecture that is severely disrupted by opioid withdrawal. Do not combine with MAT opioids without physician guidance — serotonin effects of some opioids (tramadol notably) create interaction risk.

Vitamin D3 + K2	3000–5000 IU D3 + 100mcg K2	Morning with fat	Vitamin D supports endorphin synthesis and has direct anti-inflammatory effects on the neuroinflammation of chronic opioid use. Deficiency is extremely common in opioid use disorder populations — associated with lifestyle factors, indoor residence, and the general nutritional neglect of active addiction. Test and supplement.

4.3 — Pain Management in Recovery

THE CENTURION — The Pain Was Real. Recovery Requires Managing It Without Opioids.

Many people reading this guide had legitimate pain before fentanyl, during fentanyl use, and will have pain in recovery. Opioid use disorder does not mean the pain was not real. For most people with fentanyl use disorder, there is genuine physical pain — injury, chronic condition, neuropathic — that the opioids were genuinely addressing.

Recovery from opioid use disorder requires a pain management plan that does not include opioids. This plan must be established with a physician — ideally one who understands both addiction medicine and pain management. The following non-opioid pain management approaches have evidence:

Approach	Evidence and mechanism	Implementation
Buprenorphine (for pain in OUD recovery)	Buprenorphine has significant analgesic properties at standard OUD doses — particularly the buprenorphine in Suboxone. The same medication that treats OUD also addresses pain for many patients without requiring separate opioid pain prescriptions.	Discuss pain management with your MAT prescriber specifically. Buprenorphine dosing may be optimized to address pain alongside OUD. This simplifies the treatment picture rather than complicating it.
Low Dose Naltrexone (LDN)	At very low doses (1.5–4.5mg, taken at night), naltrexone paradoxically activates endorphin production through brief receptor blockade. Used for fibromyalgia, chronic pain, and autoimmune conditions. Distinct from standard OUD naltrexone dosing.	Available through compounding pharmacies with prescription. Some pain specialists use this. Not compatible with opioid use (including buprenorphine) — only applicable in fully opioid-free recovery.
NSAIDs and	Non-opioid analgesics for mild-	Liver function monitoring is

acetaminophen	moderate pain. NSAIDs (ibuprofen, naproxen) are anti-inflammatory. Acetaminophen is centrally-acting. Both are appropriate for short-term pain management in OUD recovery.	important given the hepatic load of opioid metabolism, alcohol co-use, and HCV/HBV that may be present. Avoid chronic high-dose acetaminophen. NSAIDs with GI protection if using regularly.
Physical therapy and targeted exercise	The most evidence-based non-pharmacological pain treatment for most musculoskeletal pain. Strengthening the muscles around a pain site reduces pain through mechanical load reduction and endorphin release.	Physiatrist or physical therapist referral. Exercise-induced endorphin release is the most direct natural opioid system activation available — pain management and endorphin rebuilding converge.
Neuropathic pain medications	Gabapentin, pregabalin, duloxetine, amitriptyline — approved for neuropathic pain. Non-opioid mechanism. Note: gabapentin and pregabalin have their own misuse potential, particularly in OUD populations — discuss risk-benefit with prescriber.	These medications require physician prescription and appropriate monitoring. They are not inherently safer from a misuse standpoint than other medications in OUD populations — their use requires clear indication and monitoring.
Interventional pain procedures	Nerve blocks, spinal cord stimulation, trigger point injections — for appropriate pain conditions. Provide targeted relief without systemic opioid exposure.	Pain management specialist or anesthesiologist referral. Appropriate for specific pain conditions where the evidence supports interventional approaches.

4.4 — Withdrawal and PAWS Management

Acute opioid withdrawal from fentanyl can be severe. The compendium names it: 'HPA axis in overdrive → physical and psychological pain. Everything hurts — physically and emotionally. No internal pain buffer.'

- Clonidine (alpha-2 agonist): addresses the HPA axis overdrive of withdrawal — reduces autonomic symptoms (sweating, anxiety, rapid heart rate, high blood pressure, goosebumps) without acting on opioid receptors. Available by prescription. One of the most effective withdrawal comfort medications. Side effects: sedation, low blood pressure.
- Loperamide (Imodium): for GI symptoms of withdrawal. Acts on opioid receptors in the gut without significant CNS effect at normal doses. CAUTION: very high doses of loperamide have been misused for opioid effect — use only at recommended doses for diarrhea management.
- NSAIDs and acetaminophen: for the generalized pain and muscle aches of withdrawal

- Magnesium glycinate: for the anxiety, insomnia, and muscle cramping of withdrawal — NMDA antagonism and GABA receptor support address multiple withdrawal mechanisms simultaneously
- Hydroxyzine: non-addictive antihistamine with anxiolytic properties — supports sleep and anxiety during withdrawal without adding addiction risk
- PAWS (Post-Acute Withdrawal Syndrome): opioid PAWS can last 6–18 months with episodic dysphoria, anxiety, insomnia, and craving. The NAC, DLPA, exercise, and connection protocols from Sections 4.2 and 6 address PAWS directly. Document PAWS episodes to reveal the pattern.

4.5 — Sleep Reconstruction

The compendium's opioid withdrawal sonic protocol: '60–75 BPM, warm frequencies (bass, mid-range), emphasize 528 Hz, ambient, new age, classical strings, nature sounds, legato, no silence gaps. Music with emotional warmth, not just beats. Nostalgic music from childhood can help.'

- Melatonin: 0.5–1mg sublingual, 30–60 min before target sleep time. Low dose. Opioid withdrawal produces severe insomnia — the HPA axis overdrive and the absence of opioid-mediated sedation mean the system does not downregulate to sleep. Melatonin provides the circadian signal without pharmacological dependence.
- Magnesium glycinate: 400mg elemental evening. NMDA antagonism and GABA support for sleep onset.
- Glycine: 3–5g, 30 min before bed. Core body temperature reduction (primary physiological sleep trigger).
- L-Theanine: 200–400mg evening. Alpha-wave promotion; reduces the anxious hyperarousal that opioid withdrawal produces.
- 5-HTP: 50mg evening. Serotonin-melatonin conversion for sleep architecture support.

Sleep in MAT stabilization is often significantly better than in acute withdrawal without MAT — methadone and buprenorphine both have sedating properties that support sleep during induction. This is a genuine quality-of-life benefit of MAT beyond its overdose prevention function.

4.6 — Hepatitis C and HIV Assessment

THE CENTURION — The Infectious Disease Priorities in Fentanyl Recovery

- Hepatitis C (HCV): IV opioid use carries very high HCV transmission risk. HCV antibody test at baseline. If positive: HCV RNA for active infection. TREATMENT IS NOW CURATIVE — 8–12 week direct-acting antiviral course with 95%+ cure rate regardless of genotype. Treat HCV during recovery. Do not wait for 'more stable recovery' — curing HCV improves recovery outcomes.

- HIV: HIV test at baseline for any IV opioid use. If positive: ART initiation immediately. U=U (Undetectable = Untransmittable) at suppressed viral load. NOTE: Many ARTs are strong CYP3A4 inhibitors — they dramatically affect fentanyl metabolism. Disclose all substances to your HIV provider.
- Hepatitis B: vaccination if not immune. Test for active infection if IV use history.
- Bacterial endocarditis: fever, heart murmur, or unexplained fatigue after IV opioid use requires urgent cardiac evaluation. Endocarditis from IV drug use can be fatal without prompt treatment.
- Wound care and vein health: IV fentanyl use damages veins progressively. Wound care assessment, vein rest during recovery, appropriate wound management for any injection site infections.

4.7 — Peptide Support Layer

Peptide	Why it matters for fentanyl recovery	Timing	Notes
BPC-157	MOR receptor pathway modulation (documented in research models of opioid dependence); gut-brain axis repair from the profound GI disruption of opioid use; dopamine and serotonin normalization; neuroprotection from the neuroinflammation of chronic opioid use	Day 1 post-cessation or alongside MAT — daily	BPC-157 is the most mechanistically relevant peptide for fentanyl recovery because of its documented opioid receptor pathway modulation. Animal models show BPC-157 reduces opioid dependence markers and supports dopaminergic recovery. Oral form appropriate. Compatible with MAT — discuss with prescriber.
Selank	GABA and serotonin modulation; anxiolytic without dependence; reduces the HPA axis-driven anxiety of opioid withdrawal and PAWS without adding addiction risk	Weeks 1–12 as needed for anxiety	The anxiety and hypervigilance of opioid withdrawal is the most distressing early symptom for many and the primary driver of return to use. Selank provides genuine non-addictive anxiolytic support. Intranasal. Compatible with MAT.
Semax	BDNF upregulation; cognitive repair; dopamine and serotonin modulation; prefrontal cortex support — relevant for the impaired	Week 2 onwards	Chronic fentanyl use produces measurable prefrontal cortex impairment — particularly in decision-making and impulse inhibition. Semax's

	decision-making and impulse control of opioid use disorder recovery		BDNF-driven prefrontal support addresses this. Particularly relevant for the 'I know I shouldn't but...' moments of early recovery. Intranasal.
Epitalon	Sleep architecture normalization; circadian reset; telomere protection — relevant to the severe sleep disruption of opioid withdrawal and the accelerated aging that chronic opioid use produces	Weeks 1–4	Opioid withdrawal insomnia is among the most severe withdrawal sleep disruptions documented. Epitalon directly supports the pineal-melatonin pathway and circadian biology that opioids chronically disrupted.

Section 5 — The Fentanyl Craving — Understanding and Interrupting

THE CENTURION — The Most Lethal Craving in This Guide Series — Because Relapse After Abstinence Frequently Kills

Fentanyl cravings in recovery carry a specific lethality that no other substance in this series matches. The craving itself is not more intense than opioid cravings generally — but the consequence of following it, after even a brief period of abstinence, is potentially lethal. Tolerance drops within days of stopping. A dose that was ordinary before the abstinence period is frequently fatal after it. The person who relapses to fentanyl after two weeks of abstinence is using an unknown dose of an unknown supply with dramatically reduced tolerance.

This is the clinical context that the craving interrupt protocol operates in. Every interrupted craving is not merely a recovery win — it is potentially a life.

Fentanyl Craving Trigger Map

Trigger	The underlying state	The interrupt
Pain — physical or emotional	The compendium: 'everything hurts — physically and emotionally. No internal pain buffer.' Pain was a primary driver of fentanyl use for most users. When pain appears in recovery — physical injury, emotional loss, interpersonal stress — the brain's trained response is: fentanyl was the solution for this.	Pain management plan (Section 4.3) executes here. Contact prescriber for physical pain above threshold. Execute Protocol 01 for emotional pain. 4-7-8 breathing for HPA axis management. Social contact. The pain is real — the management strategy is medicine, not willpower.
The 'flu' feeling — PAWS symptoms mimicking withdrawal	PAWS produces episodic symptoms — dysphoria, anxiety, body aches, insomnia — that are subjectively indistinguishable from early withdrawal. The brain's interpretation: withdrawal is beginning. The solution: dose. But this is PAWS, not active withdrawal, and dosing after abstinence carries lethal risk.	Name PAWS specifically: 'This is a PAWS episode, not active withdrawal. I have not used. My receptors are not depleted. This will pass.' NAC immediately. Magnesium. Clonidine if prescribed for PAWS management. DLPA for endorphin support. Document and call your support structure.
Post-incarceration / post-detox / post-hospitalization	The highest risk period for fatal fentanyl overdose is the 2 weeks following release from	This is a medical emergency in advance. Before release from any supervised setting:

	any supervised abstinence — incarceration, hospital, detox. The craving is intense (it has been suppressed for the period of abstinence), tolerance is at its lowest, and supply is newly accessible.	naloxone in hand, MAT established (buprenorphine or methadone bridge if possible), housing and support contact confirmed, plan for the first 72 hours specifically documented. Do not leave a supervised setting without MAT arranged if at all possible.
Specific environmental cues — people, places, things	Classic Pavlovian conditioning: the syringe, the spoon, the specific neighborhood, the face of a using partner — any environmental cue paired with fentanyl use fires the anticipatory dopamine and endorphin signals at full strength.	Protocol 05 (environmental redesign) is critical and requires thoroughness. The geographic cues may require route changes, neighborhood changes, or housing changes. The people-cues require distance from using contacts. Digital cues (messaging apps with dealers or using partners) require deletion. This is not abandonment — it is survival.
Emotional pain — loss, rejection, shame, loneliness	Fentanyl's MOR activation provided emotional analgesia — relief from the pain of living that the endorphin system could not adequately buffer. Emotional pain in recovery activates the trained solution: fentanyl.	This is when the endorphin-building architecture (Section 6) matters most. Exercise for immediate endorphin release. Connection for oxytocin-mediated MOR activation. The 988 crisis line for acute emotional crisis. Therapy for the underlying pain. The craving is pointing at real pain — the interrupt addresses both the craving and the pain.

THE FENTANYL CRAVING INTERRUPT — 5-MINUTE PROTOCOL

10. CALL YOUR SUPPORT IMMEDIATELY. Before any other step — call or text your support person, sponsor, MAT prescriber, or 988. The fentanyl craving's lethal consequence if followed makes immediate connection the first priority, not the fifth.
11. EXECUTE 4-7-8 BREATHING — EIGHT CYCLES. The HPA axis overdrive of fentanyl craving requires more parasympathetic activation than standard. Eight cycles. Do not abbreviate.
12. TAKE DLPA, NAC, AND MAGNESIUM. DLPA extends your body's own endorphins. NAC addresses the glutamate component of the craving. Magnesium addresses the HPA axis and anxiety. These are pharmacological interventions for a pharmacological state.
13. NAME THE TRIGGER PRECISELY. Pain? PAWS? Environmental cue? Emotional pain? The name determines the parallel response — pain management,

PAWS protocol, environmental exit, crisis support. The name is the first cognitive intervention.

14. CHANGE YOUR ENVIRONMENT IMMEDIATELY. If near a high-risk environment: physical exit before anything else. If in an emotional crisis at home: change rooms, go outside, go to a public space where using is not possible.
15. EXECUTE YOUR NATURAL ENDORPHIN ACTIVATION. From Section 6: vigorous exercise, meaningful human connection, any activity that generates genuine endorphin release. The craving is pointing at an endorphin deficit. Fill it through a source that does not carry lethal risk.
16. DOCUMENT. Trigger, type, intensity, action, outcome. After three weeks, this data reveals your specific risk architecture — when, where, and what produces the cravings — with the precision that makes genuine protection possible.

Section 6 — Building the Natural Endorphin Architecture

THE CENTURION — Centurian Paper C-28 Applied to Fentanyl Recovery — The Pain Buffer the Body Already Knows How to Build

Fentanyl provided something specific: a pain buffer so complete that physical and emotional pain became tolerable, the world became softer, the self became quieter, and the social disconnection that chronic pain produces briefly dissolved. The endorphin system the brain was designed with can provide all of these — incompletely, less immediately, with effort — but genuinely and sustainably.

The opioid sonic protocol from the compendium says it: 'human connection and warmth... singer-songwriter, folk, acoustic... sad music is appropriate — it validates the grief process.' Recovery is not the forced suppression of pain. It is the rebuilding of the system that metabolizes it.

The Natural Endorphin Architecture

Endorphin source	MOR activation magnitude	How to implement	For fentanyl recovery specifically
Vigorous sustained exercise — the primary endorphin activator	High — endorphin release is largest with sustained high-intensity exercise	Running, swimming, cycling, rowing — 45+ minutes at challenging intensity. Daily where physically possible. Build from where you are.	Exercise endorphin release directly activates MOR receptors — the same receptors fentanyl was saturating. This is not metaphor. Exercise literally provides endogenous opioid activation through the same biological pathway. It also generates BDNF for cognitive repair and provides the cardiovascular rehabilitation needed after chronic opioid use's sedentary effects. Non-optional. Begin Week 1 even if brief. Build progressively.
Genuine human connection — especially physical safe touch	High — social bonding endorphin release is real and significant	Hugs, physical presence with trusted people, laughter with others, eye contact and genuine conversation. These are not nice-to-haves — they are	The compendium names OPRM1's role in social bonding reward. Fentanyl saturated the same receptors that genuine human connection activates naturally. Recovery requires rebuilding the capacity for connection to generate that activation — which means

		pharmacological interventions.	practicing the vulnerability that opioids were buffering. Recovery communities provide this environment specifically.
Laughter — genuine, shared, unforced	Moderate-High — endorphin and dopamine simultaneously	Comedy. Absurdity. Play with safe people. Not consuming funny content alone — laughing with others.	The endorphin release from genuine laughter (not laughing at screens alone) activates MOR through the social bonding pathway. This is clinically measurable — laughter increases pain thresholds through MOR-mediated endorphin release. For people rebuilding pain tolerance without opioids: laughter is literally analgesic.
Cold exposure	High — acute endorphin surge followed by sustained elevated pain threshold	Cold shower finale (30–120 seconds), cold plunge, cold water immersion. Build gradually.	Cold exposure produces endorphin release and norepinephrine surge simultaneously — addressing both the pain sensitivity and the energy deficit of early opioid recovery. The pain tolerance that builds with regular cold exposure directly supports opioid recovery by providing a genuine natural pain buffer that replaces the pharmacological one.
Music with emotional depth — the grief process	Moderate — serotonin and endorphin, particularly with music that validates emotional pain	The compendium: 'sad music is appropriate — it validates the grief process.' Active listening. Music that matches and validates the emotional state.	The grief work of opioid recovery is real. The relationships, the time, the health, the experiences that opioid use cost — these require genuine mourning. Music that validates grief is not wallowing. It is the nervous system processing loss through a channel that is safe, regulated, and pharmacologically supportive (serotonin and endorphin co-release from emotionally resonant music).
Service — specifically to others with opioid use disorder	High sustained — the meaning and oxytocin of genuine contribution	Peer recovery support, narcan training, harm reduction volunteering, twelve-step sponsorship, community advocacy. Being the person who carries naloxone to someone who needs	The person who has survived fentanyl — who has been through the overdoses (their own or others'), the criminal justice system, the treatment failures, the grief — has specific knowledge that no professional training provides. As a peer recovery supporter, this knowledge saves lives. The oxytocin and meaning of this contribution provide the most

		it.	sustained and reliable endorphin architecture available in long-term recovery.
Spiritual practice and contemplative community	Moderate-High with sustained practice — MOR activation through community, meaning, and the transcendence states of deep contemplative practice	Any spiritual tradition with genuine community practice. Not passive attendance — active participation, vulnerability, and contribution.	The compendium's contemplative architecture applies to opioid recovery with specific relevance: the pain management that opioids provided included a kind of spiritual analgesia — the sense that everything was okay, that the weight was manageable, that relief was possible. Contemplative practice rebuilds this through genuine spiritual development rather than pharmacological approximation.

Section 7 — Navigating the Recovery Kernel: Your Protocol Map

Phase	Protocols	Primary focus	Fentanyl-specific notes
Immediate Safety (Day 0)	Section 0 of this guide — naloxone, 911, harm reduction	Naloxone in hand; overdose response trained; xylazine awareness; fentanyl test strips	Before any recovery work begins, the physical survival infrastructure must be in place. Naloxone is not optional. Good Samaritan laws protect its use. If you are not yet ready to stop: harm reduction mode. Fentanyl test strips, never use alone, naloxone nearby, 911 available.
MAT Initiation (Days 0–7)	MAT prescriber or OTP — Section 3 of this guide	Buprenorphine or methadone induction; withdrawal management; fentanyl-specific induction timing	MAT is the first-line medical intervention and should be established before or concurrent with any other recovery work. The supplement stack in Section 4 begins alongside MAT — they are additive, not alternative. If MAT is being declined: discuss the evidence with your provider. The mortality reduction data is definitive.
Biological Foundation (Days 1–14)	Protocol 07, Protocol 09, Protocol 17, Protocol 18	DLPA, NAC, 5-MTHF, magnesium, omega-3, DLPA, sleep stack, nutrition, hydration	DLPA and NAC on Day 1. Magnesium on Day 1. 5-MTHF on Day 1. These three together address: endorphin system support (DLPA), glutamate craving (NAC), and synthesis foundation (5-MTHF). Begin exercise as soon as physically possible — even a 10-minute walk. The endorphin activation from exercise begins immediately.
Medical Assessment (Week 1)	Physician, infectious disease, dental	HCV testing and treatment; HIV testing; cardiac assessment for IV use; wound assessment; pain management plan	HCV treatment should begin in Week 1 if active infection is confirmed — curing HCV during recovery improves outcomes. HIV: ART initiation immediately with FULL DISCLOSURE of all substances to HIV provider — CYP3A4 interactions with MAT are clinically significant.
Genomic Mapping (Weeks 1–4)	Section 15 (Compendium); OPRM1,	MAT response prediction (OPRM1); metabolism safety	OPRM1 G allele determines naltrexone response — if extended-release naltrexone (Vivitrol) is being

	CYP2D6, CYP3A4, COMT, MTHFR	(CYP2D6, CYP3A4); pain sensitivity (COMT); synthesis deficit (MTHFR)	considered after detox, OPRM1 testing provides the strongest MAT selection guidance. CYP3A4 and CYP2D6 testing informs MAT dosing and drug-drug interaction risk.
Endorphin Architecture Building (Months 1–12)	Protocol 03 (exercise), Protocol 04, Protocol 08, Protocol 22; Section 6	Daily vigorous exercise; genuine community; laughter; cold exposure; music; service	The endorphin architecture is built through consistent daily practice, not episodic effort. Exercise must become daily. Community must become structural. The service role must be found and entered. These practices converge over months to produce a genuine endorphin system that operates without pharmacological support.
Pain Management Track (Months 1–12+)	Pain management specialist; MAT prescriber; physical therapist	Non-opioid chronic pain management; physical therapy; MAT for pain	For the significant proportion of fentanyl recovery population with genuine chronic pain: the pain management track runs parallel to and indefinitely alongside the recovery track. These are not competing priorities. Buprenorphine addresses both simultaneously for many patients — discuss explicitly with your MAT prescriber.
Identity and Long Game (Months 6+)	Protocol 20, Protocol 21, C-28; peer recovery support	The person who survived fentanyl; the Warrior or Sage fully expressed; purpose through service	Peer recovery support for others in fentanyl use disorder is the long game's most powerful element. The person who carries naloxone into harm reduction spaces, who sits with someone in the worst moment and says 'I have been where you are,' who provides the evidence that recovery is survivable — this person is doing the most important work in the deadliest period in the epidemic's history.

Section 8 — The Medical Context: The Epidemic, the Medicine, and the Gap

The compendium's historical frame is the only appropriate opening for this section: the prescription opioid epidemic (Purdue Pharma, OxyContin, the Sackler family's $13 billion while 400,000 people died), the supply tightening that drove people from prescription opioids to heroin, and the fentanyl contamination that followed. The current crisis was created by deliberate commercial decisions and enabled by regulatory capture. The people who died and the people who are still using were not failed by their own character. They were failed by the systems that profited from the pipeline and then criminalized the people stuck in it.

8.1 — The Regulatory and Policy Context

- DEA X-waiver removal (2023): buprenorphine can now be prescribed by any DEA-registered provider without the previous special waiver. This is the single most important policy change for fentanyl recovery access in decades. It means your primary care physician, your emergency room, your urgent care — all can prescribe buprenorphine. Ask for it.
- Good Samaritan laws: available in 47 states — protect people who call 911 for an overdose from prosecution for drug possession at the scene. Know your state's law. Call 911. The fear of prosecution should not prevent calling for help.
- The incarceration barrier: as with crack cocaine, fentanyl use disorder disproportionately intersects with the criminal justice system. Drug court, MAT in correctional settings, and reentry planning with MAT continuation are the specific interventions for people navigating the legal system alongside fentanyl recovery.
- Insurance coverage: all Medicaid programs must cover MAT as of federal requirements. Medicare Part D covers MAT. The ACA prohibited insurers from requiring prior authorization for buprenorphine as of 2023 in most cases. If coverage is being denied: file an appeal, contact your state insurance commissioner, or seek legal aid.

8.2 — Clinical Guidelines and Resources

- SAMHSA (Substance Abuse and Mental Health Services Administration): findtreatment.gov for treatment locators; 1-800-662-4357 for navigation assistance; SAMHSA's TIP 63 (medications for opioid use disorder) is the federal clinical guideline
- American Society of Addiction Medicine (ASAM): asam.org; publishes clinical practice guidelines for opioid use disorder treatment

- National Alliance of Advocates for Buprenorphine Treatment: naabt.org; patient advocacy and provider finder
- NEXT Distro (nextdistro.org): harm reduction supplies including naloxone by mail in eligible states
- SMART Recovery: smartrecovery.org; evidence-based, non-12-step peer support
- Narcotics Anonymous: na.org; peer support through the 12-step model; specifically addresses opioid use disorder
- National Drug Helpline: 1-844-289-0879 (24/7)

A Final Word

THE CENTURION — The Deadliest Period in the Epidemic's History — and the People Surviving It

110,000 Americans died of drug overdose in 2022. The majority involved fentanyl. 110,000 people is more than died in the Vietnam War. It is more than died of HIV at the peak of the AIDS epidemic in 1995. It is happening in every state, every county, every demographic, every income level — though not equally, and the inequalities follow the same lines they always have.

The people who died were not weaker than the people who used opioids before fentanyl arrived in the supply. They were given a molecule that is 100 times more potent than morphine, distributed in a supply that cannot be standardized, in an era when the treatment infrastructure was still primarily built for a different substance. They were failed before they ever put the pill in their mouth or the needle in their vein.

The Recovery Kernel was built for the people who ran out of time before anyone told them their biology was not their weakness. In the fentanyl era, some of those people ran out of time because naloxone arrived 90 seconds too late, or because the counterfeit pill contained a hotspot, or because they left incarceration on a Friday and treatment wasn't available until Monday.

For the people who are still here: the medicine works. Buprenorphine reduces overdose mortality by 50–70%. That is not a marginal improvement. It is the difference between most people dying and most people surviving. The evidence is unambiguous, and it has been unambiguous for two decades while stigma and policy argued against making the medicine available.

The compendium named the gap: 'treatment infrastructure absent; punishment substituted for medicine.' Recovery from fentanyl requires that the gap be named before it can be navigated. The biological work in this guide — rebuilding the endorphin system that fentanyl suppressed, addressing the pain that drove the use, developing the genuine human connection that MOR activation always knew was the real target — runs on top of MAT, not instead of it.

The endorphin system knows how to generate the pain buffer, the emotional analgesic, the social bonding warmth, and the sense that the weight is manageable. It was doing it before fentanyl arrived and it will be doing it long after. Recovery is giving it the conditions under which it can.

Every day sober in the fentanyl era is an act of survival. Every naloxone dose administered is an act of love. Every person who makes it through to the other side and reaches back carries the most important available evidence: that the other side exists.

This guide was built so you could find it.

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Naloxone: any US pharmacy without prescription | Treatment locator: findtreatment.gov | Crisis: 988 | SAMHSA: 1-800-662-4357

Refer to the Recovery Kernel Complete Centurion Compendium for all referenced protocols.

Crisis: call or text 988 | Emergency: 911 | SAMHSA: 1-800-662-4357 | National Drug Helpline: 1-844-289-0879

⚠ HARM REDUCTION RESOURCE — NOT MEDICAL ADVICE